STUDIES ON JELLIED MEAT OF SWORD FISH II. NUMERICAL CHANGE OF PARASITIC GERMS IN THE JELLIED MEAT OF SWORD FISH DURING COLD-STORAGE

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By

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In the preceding paper, the senior author and Y. TATSUKAWA have reported on the chemical characteristic features of jellied meat of sword fish (1). It contains a large amount of moisture and a small amount of fat compared with normal meat. It is also noticed that the large contents of water soluble nitrogen, especially in amino acid nitrogen, are derived from digestion of the muscle protein. Jellied meat is not referable to the so-called spoiled meat because the values of volatile basic nitrogen are below 20 milligrams per cent and the pH value is 5.7~5.8. Therefore it may be considered as the disordered meat which was primarily liquefied by cathepsin or some other similar enzymes of Chloromyxum (2), possibly aided by the partial colaboration of bacterial trypsin.

Subsequently it was noticed that the parasitic germs in the jellied meat seemed to decrease after a few months of cold-strage. Therefore, if this could be quantitatively verified, we might expect that the treatment of freezing and cold-storage immediately after catching may be utilized for the reduction of jellying or even for the extermination of the few parasites which exist in meat. The present paper deals with the numerical change of Chloromyxum in the jellied meat of sword fish during cold-storage.

Materials and Methods

Materials: The materials used in this experiment were jellied meat of sword fish, landed at the Shiogama fish-market on November, 1954.

Methods: Several jellied portions carrying many parasitic cysts are cut off, wrapped separately in cellophane bags and kept in cold-storage at $-18°C$. After various periods of storage as shown in Table 1, some materials were

taken out, cut in small pieces and placed in a mortar.

These were ground and pressed out into a small beaker through filter-cotton. The muscle juice thus obtained was spotted on five plates of slide glass by 0.01 ml. After drying at room temperature, the residues were stained with thionine-blue and fixed in the usual manner. The number of Chloromyxum in the preparations was directly counted under the microscope under the magnification of 100 times, and an average value per 0.01 ml was found.

Results and Discussion

The results are summarized in Table 1.

Table 1. Numerical decrease of Chloromyxum in the jellied meat of sword fish during cold-storage.

Time in Weeks	2	5	9	11	15
Number of	1445	783	702	315	292
Chloromyxum	1366	702	698	287	291
per 0.01 ml	1243	590	677	278	254
of muscle	1219	578	578	240	253
juice	1108	547	567	227	233
Average	1276	640	644	269	265

Table 1 indicates that the parasitic germs in sword fish decrease gradually during the cold-storage, though the tendency of reduction is not so regular. At the same time, it is noteworthy that collapsed cysts were found under the microscope and that the injured Chloromyxums increased gradually with the lapse of storage months. The decayed forms are shown in Figure 1.

It is supposed that these may be roughly classified in two types; The first (b~g) is a self-destruction or autolytic-decaying form due to the hindrance of living function by freezing and the second (h~i) is mechanical disintegration owing to the growth of ice crystals.

Considering from the above facts, it may be concluded that the parasitic germs found in sword fish meat is susceptible to a low temperature and subsequently will mostly perish by the treatment of cold-storage at $-18°C$. Some of them, however, can survive under such condition for ten months and liquefy themselves after thawing, though the results are not cited here. It is proved that the freezing and cold-storage are not a complete method for the prevention of jellied meat, but are an effective one for the reduction or hindrance of spreading of parasites.

At the present time the sword fish are only preserved in ice during transportation to a fishing port in Japan. Therefore, the freezing and cold-storage immediately after catching are recommended for not only keeping the

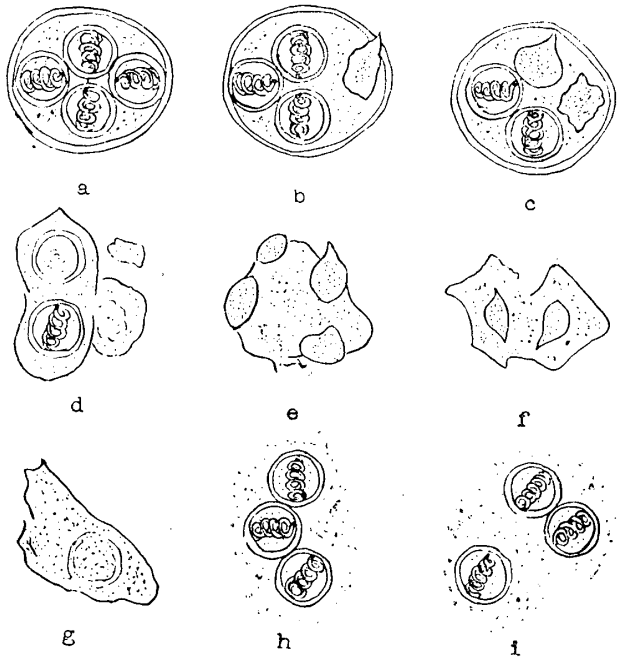

Fig. 1. Various forms of decayed Chloromyxum's spore (a is normal form).

freshness of the sword fish meat but also for the prevention of jellying outbreak to some extent.

Summary

1. Parasitic germs in sword fish flesh decrease gradually with a few months cold-storage at −18°C, but did not perish completely.

2. The freezing and cold-storage immediately after catching are recommended for not only keeping the freshness of the sword fish but also for preventing the outbreak of jellied meat to some extent.

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